

Claims:

1. A process for monitoring the distribution of structures on a surface or of particles in space, characterised in that:
- (a) at least one two-dimensional image of the distribution is produced optically or electronically, is broken down into pixels and the brightness value of each pixel is stored in digitised form on a data storage medium;
- (b) the image or a portion thereof is divided into a preselected number of image elements arranged in rows, each image element comprising at least four pixels;
- (c) the average brightness value of each image element is determined by averaging the brightness values of the individual pixels of this image element;
- (d) the difference between the average brightness values of adjacent image elements is determined along a first specified row of image elements and recorded machine-readably on a data storage medium and/or output as a diagram in such a manner that a spatial correlation is obtained between the difference values and the position of the associated image elements on the image;
- and, if desired,
- (e) stage (d) is repeated with a preselected number of additional rows of image elements which are substantially parallel to the first specified row.
2. A process as claimed in claim 1 wherein, before determining the differences between the average brightness values of adjacent image elements, an illumination correction is performed by subtracting a preselected correction value from the brightness values of each individual pixel before the average brightness value of the image elements is determined or from the average brightness values of the individual image elements, or a preselected correction value is added to these brightness values, the correction values associated with the individual pixels or image elements describing an area of the image or portion of image.

3. A process as claimed in one or both of claims 1 and 2 wherein rectangular or trapezoidal image portions are selected, the side lengths of which correspond to lengths in real space in the range from 1 mm to 5 m.
4. A process as claimed in one or more of claims 1 to 3 wherein sub-stages (d) and (e) are repeated with a second specified row of image elements, which forms a preselected angle relative to the first specified row of image elements in the range from 60 to 120°.
5. A process as claimed in one or more of claims 1 to 4 wherein the distribution of structures is monitored on a metal or plastic surface.
10. 6. A process as claimed in claim 5 wherein it involves a metal or plastic surface on which the occurrence of water drops is monitored after a preceding cleaning and/or hydrophilisation operation.
7. A process as claimed in claim 5 wherein it involves a metal or plastic surface which has been subjected to chemical treatment or coating.
15. 8. A process as claimed in claim 7 wherein it involves a metal surface which has been subjected to chemical treatment in the form of chromating, treatment with an acidic solution of simple and/or complex fluorides, treatment with a solution of transition metal compounds or film-forming or non-film-forming phosphating.
20. 9. A process as claimed in claim 7 wherein it involves a metal or plastic surface which has been coated with crosslinkable organic substances.
25. 10. A process as claimed in one or more of claims 6 to 9 wherein according to sub-stage (a), a first image of at least approximately the same point on the metal or plastic surface is produced before and a second image after the cleaning and/or hydrophilisation, the chemical treatment or coating, before or

5 after performing sub-stages (b) and (c) for at least the second image, the two images are superimposed computationally by searching for characteristic points on the metal or plastic surface which are detectable on both images, these characteristic points on the two images are at least approximately superimposed and the brightness values of the pixels or the average brightness values of the image elements in the first image are then subtracted from the brightness values of the corresponding pixels or image elements in the second image, before sub-stage (d) and, if desired, sub-stage (e) is performed with the second image.

- 10 11. A process as claimed in one or more of claims 5 to 10 wherein one or more of the following actions is automatically initiated when the difference in the brightness values of adjacent image elements exceeds a specified amount at least once or at least n times, wherein n means a specified number:
- 15 (i) output of a warning;
(ii) start of checking of at least one piece of the treatment or coating equipment with which the metal or plastic surface has come into contact before sub-stage (a);
(iii) shut-down of the plant performing the cleaning and/or hydrophilisation, chemical treatment or coating.
- 20 12. A process as claimed in one or more of claims 1 to 4 for monitoring the distribution of particles in a jet of particles, wherein at least one image of a particle jet produced by spraying through one or more nozzles is monitored, which image is recorded substantially perpendicularly to the spray axis.
- 25 13. A process as claimed in claim 12 wherein sub-stages (a) to (e) are repeated once or two or more times with images, the image planes of which form a specified angle relative to each other.
14. A process as claimed in one or both of claims 12 and 13 wherein the particles

are droplets of a solution or a suspension which are dried in the particle jet to yield solid particles, or droplets of a melt which solidify in the particle jet to yield solid particles.

- 5 15. A process as claimed in one or both of claims 12 and 13 wherein the particles are droplets of a solution, suspension or melt which are sprayed onto a surface in order to produce a coating on this surface.
- 10 16. A process as claimed in one or both of claims 12 and 13 wherein the particles are solid particles with which a surface is coated.
- 15 17. A process as claimed in one or more of claims 12 to 16 wherein a warning is automatically output when the difference in the brightness values of adjacent image elements within the particle jet exceeds a specified amount.
- 20 18. A process as claimed in one or more of claims 12 to 16 wherein the angle of divergence of a particle jet produced by spraying through one or more nozzles is monitored.
- 25 19. A process as claimed in claim 18 wherein one or more of the following actions is automatically initiated when the angle of divergence of the spray jet falls below or exceeds a specified angle range:
- (i) output of a warning;
 - (ii) modification of the spray pressure in the direction which returns the angle of divergence of the spray jet to within the specified angle range;
 - (iii) modification of the viscosity of the composition from which the spray jet is produced in the direction which returns the angle of divergence of the spray jet to within the specified angle range;
 - (iv) modification of the electrical charge of the particles of the

DECEMBER EIGHTY ONE
FIVE EIGHTY ONE

spray jet or of electric fields in the vicinity of the nozzles in
the direction which returns the angle of divergence of the spray
jet to within the specified angle range;

- (v) shut-down of the spray jet.

add
ar